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(71) Applicant: 000005821
Matsushita Electric Industrial Co., Ltd.
1006 Oaza-Kadoma, Kadoma-shi, Osaka-fu

(72) Inventors: Takashi Masuno
Matsushita Electric Industrial Co., Ltd.
1006 Oaza-Kadoma, Kadoma-shi, Osaka-fu

Kazuhiko Kikuchi
Matsushita Electric Industrial Co., Ltd.
1006 Oaza-Kadoma, Kadoma-shi, Osaka-fu

(74) Agent: Akira Kokaji, patent attorney, and 2 others

(54) [Title] DEMODULATOR

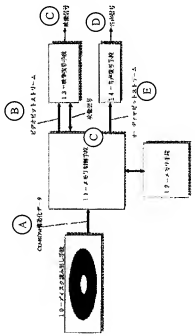
(57) Abstract

Objective

The objective is to provide a small, inexpensive demodulator that can effectively utilize memory element storage capacity while also decreasing the number of components by consolidating multiple required memory elements.

Constitution

Individual decoding means (13, 14) use both the memory space in a buffer required to moderate variation between fixed rate input and decoding time (rate) and memory space for system bitstream input, and are provided in a memory means 12, and the memory space used for decoding by video decoding means 13 is also consolidated in the same memory means 12.



Key:		
	A	CD-ROM structured data
	B	Video bitstream
	C	Video signal
	D	Audio signal
	E	Audio bitstream
	10	Disc reading means
	11	Memory control means
	12	Memory means
	13	Video decoding means
	14	Audio decoding means

Claims

1. A demodulator that decodes and reproduces packet data strings in which video bitstreams and audio bitstreams, wherein a video signal and an audio signal are encoded, respectively, with high performance, are time division multiplexed with a specified packet structure,

the demodulator being characterized by having a video decoding means that decodes the aforementioned video signal from the aforementioned video bitstream,

an audio decoding means that decodes the aforementioned audio signal from the aforementioned audio bitstream,

a memory means that has both storage capacity to temporarily hold a specified fixed quantity of packets of the aforementioned packet data strings and storage capacity used in decoding by the aforementioned video decoding means,

and a memory control means that determines whether the aforementioned packet data strings that are successively input are the aforementioned video bitstream or the aforementioned audio bitstream in parallel with writing to the aforementioned memory means, while repeatedly reading and distributing from the aforementioned memory means the aforementioned video bitstream to the aforementioned video decoding means and the aforementioned audio bitstream to the aforementioned audio decoding means according to the progress of decoding by each, and uses the aforementioned memory means to write the video data decoded by the aforementioned video decoding means, references it for the purpose of decoding or reads it for the purpose of display output.

2. A demodulator wherein at least the component elements other than the memory means described in Claim 1 are provided on the same semiconductor chip.

Detailed explanation of the invention

[0001]

Industrial application field

The present invention relates to a demodulator for high-performance coding of video and audio.

[0002]

Prior art

In recent years, in the field of digital signal processing, such as for video discs, and the field of digital broadcasting, a smaller scale for video software and devices has been achieved by encoding video signals with high performance, and the MPEG (Moving Picture Experts Group)/ISO11172 standard has been provided.

[0003]

A CD-ROM application device using the MPEG standard will be explained as an example of a conventional demodulator.

[0004]

Figure 2 is a block diagram showing the constitution of this conventional demodulator. In Figure 2, 20 is a disc reading means that reads data recorded on a CD-ROM disc. 21 is a memory control means that decodes CD-ROM structured data read by disc reading means 20, successively stores video bitstream packets and audio bitstream packets contained in the data in a memory means 22, while reading both the video bitstream and the audio bitstream from memory means 22 at an average transfer rate for data to be decoded by a video decoding means 26 and an audio decoding means 28. 26 is a video decoding means that decodes the video bitstream and outputs it as a video signal. 27 is a picture memory means that stores the video signal used in decoding by video decoding means 26. 28 is an audio decoding means that decodes the audio bitstream and outputs it as an audio signal. 24 is a video bitstream FIFO (First-In-First-Out) means that stores the video bitstream and compensates for variation in the data consumption rate during decoding by video decoding means 26. 25 is an audio bitstream FIFO means that stores the audio bitstream and compensates for variation in the data consumption rate during decoding by audio decoding means 28.

[0005]

The operation of a demodulator constituted as above will be explained below. First, disc reading means 20 reads data recorded on a disc. The fact that the data being read are in

CD-ROM data structured sector units is first recognized by memory control means 21, and the data are temporarily stored in memory means 22. Next, video bitstream packets and audio bitstream packets searched for within the stored sectors are extracted. Individual packets that are extracted are output to video bitstream FIFO means 24 and audio bitstream FIFO means 25. In this instance, the individual FIFO means outputs at a constant transfer rate so as not to cause overflow or underflow. With video decoding means 26, the video bitstream buffered by video bitstream FIFO means 24 is successively decoded and stored in picture memory means 27, and is then output as a video signal. With audio decoding means 28, the audio bitstream buffered by audio bitstream FIFO means 25 is successively decoded and output as an audio signal.

[0006]

Problems to be solved by the invention

With the aforementioned conventional constitution, however, in order for memory control means 21 to maintain output at a constant transfer rate for the individual FIFO means, memory means 22 requires storage capacity for multiple packets. In addition, memory means 22, video bitstream FIFO means 24, audio bitstream FIFO means 25 and picture memory means 27 are memory elements; this means that multiple memory elements must be used, with the problem that the storage capacity of the individual memory elements is not utilized effectively.

[0007]

On the other hand, when viewed from the standpoint of configuring the conventional example with a semiconductor element, even when three means—memory control means 21, video decoding means 26 and audio decoding means 28—are integrated on the same semiconductor chip, because there are many memory elements, the number of pins for connections increases greatly, and integration is difficult.

[0008]

The objective of the present invention is to solve the aforementioned conventional problems, and to provide a small, inexpensive demodulator that can effectively utilize the storage capacity of the memory elements while simultaneously reducing the number of components by consolidating the multiple required memory elements.

[0009]

The number of pins for connecting with the memory elements can also be reduced by consolidation and unified management of the memory elements, and the three means—memory

control means, video decoding means and audio decoding means—can be integrated on the same semiconductor chip.

[0010]

Means to solve the problems

To accomplish this objective, the demodulator of the present invention decodes and reproduces packet data strings in which video bitstreams and audio bitstreams, wherein a video signal and an audio signal are encoded, respectively, with high performance, are time division multiplexed with a specified packet structure. The demodulator has a video decoding means that decodes the aforementioned video signal from the aforementioned video bitstream, an audio decoding means that decodes the aforementioned audio signal from the aforementioned audio bitstream, a memory means that has both storage capacity to temporarily hold a specified fixed quantity of packets of the aforementioned packet data strings and storage capacity used in decoding by the aforementioned video decoding means, and a memory control means that determines whether the aforementioned packet data strings being successively input are the aforementioned video bitstream or the aforementioned audio bitstream in parallel with writing to the aforementioned memory means, while repeatedly reading and distributing from the aforementioned memory means the aforementioned video bitstream to the aforementioned video decoding means and the aforementioned audio bitstream to the aforementioned audio decoding means according to the progress of decoding by each, and uses the aforementioned memory means to write the video data decoded by the aforementioned video decoding means, references it for the purpose of decoding or reads it for the purpose of display output.

[0011]

Operation

With the present invention, due to the constitution described above, first, the memory control means successively stores in the memory means the packet data strings that are input. In parallel with storing, the individual packets in the packet data strings are classified into video bitstream packets and audio bitstream packets, and they are each managed to give a series of bitstreams in which the video bitstream and the audio bitstream in the individual packets are continuous. Next, the memory control means transfers both the video bitstream and the audio bitstream in continuous series for data requests for the bitstreams input by the video decoding means and the audio decoding means. The packet data strings that are input in this way are temporarily stored in the memory means, they are transferred to the video decoding means and the audio decoding means while being classified into video bitstreams and audio bitstreams, and a bitstream FIFO function is realized.

[0012]

With the video decoding means, a video signal is obtained from video bitstreams being successively decoded. The video signal obtained by decoding is passed to the memory control means and stored in the memory means, and is referenced with subsequent decoding or is again read from the memory means using the memory control means for the purpose of outputting in a specified video format. The audio decoding means successively decodes the audio bitstreams and outputs them as an audio signal.

[0013]

Application example

An application example of the present invention will be explained below while referring to a figure.

[0014]

Figure 1 is a block diagram showing the constitution of a demodulator in a first application example of the present invention. In Figure 1, 10 is a disc reading means that reads data recorded on a CD-ROM disc. 11 is a memory control means that decodes CD-ROM structure data read by disc reading means 10, determines the presence of a video bitstream or an audio bitstream in parallel with writing to memory means 12 of the video bitstream packets and audio bitstream packets included in the data, while also reading from memory means 12 the video bitstreams and audio bitstreams required for decoding by video decoding means 13 and audio decoding means 14, respectively, and writing the video signals decoded by video decoding means 13, or while referencing memory means 12 for the purpose of decoding or reading for the purpose of display output. 12 is a memory means that has storage capacity to hold a specified quantity of a video bitstream and an audio bitstream, and storage capacity required for decoding by video decoding means 13. 13 is a video decoding means that decodes a video bitstream and outputs it as a video signal, and 14 is an audio decoding means that decodes an audio bitstream and outputs it as an audio signal.

[0015]

Operation of the demodulator in this application example constituted as above will be explained below.

[0016]

First, disc reading means 10 reads data recorded on a disc. The data being read are first recognized as being CD-ROM data structure sector units by memory control means 11, and packet data in the sectors are temporarily stored in memory means 12. In parallel with storing, the individual packets in the packet data string are divided into video bitstream packets and audio bitstream packets, and are individually managed to give a series of bitstreams in which the video bitstreams and the audio bitstreams in the individual packets are continuous. Next, memory control means 11 transfers the individual video bitstreams and audio bitstreams in response to bitstream data requests from video decoding means 13 and audio decoding means 14. The packet data strings input in this way are temporarily stored in memory means 12, they are transferred to video decoding means 13 and audio decoding means 14, respectively, while being classified as audio bitstreams and video bitstreams, and a bitstream FIFO function is realized.

[0017]

With video decoding means 13, a video signal is obtained from the video bitstreams being successively decoded. The video signal obtained with decoding by video decoding means 13 is stored in memory means 12 via memory control means 11. The stored video signal is again read from memory means 12 via memory control means 11 for the purpose of reference as decoding by video decoding means 13 proceeds. In parallel, video decoding means 13 reads the decoded video signal from memory means 12 via memory control means 11 for the purpose of outputting a video signal in a specified video format. Audio decoding means 14 successively decodes audio bitstreams and outputs them as an audio signal.

[0018]

With this application example as above, explaining using the terminology standardized by the MPEG (Moving Picture Experts Group)/ISO11172 standard, in the past, by individual bitstreams being distributed and transferred from a system bitstream stored in an STD buffer to a VBV buffer at a specified bit rate for a video bitstream and to an AUDIO buffer at a specified bit rate for an audio bitstream, overflow or underflow in the VBV buffer and the AUDIO buffer is avoided. With the present invention, though, video bitstream packets and audio bitstream packets are differentiated from packet structured system bitstreams, the STD buffer is eliminated, and by configuring the VBV buffer and AUDIO buffer structures directly, nearly all storage capacity for an STD buffer can be eliminated, and the storage capacity of memory means 12 can be reduced to less than the total storage capacity of the memory elements in the conventional example.

[0019]

In addition, memory element connections can be simplified over the conventional example by unifying the memory elements, and three means other than memory means 12—memory control means 11, video decoding means 13 and audio decoding means 14—can easily be integrated on the same semiconductor chip by reducing the number of pins for connecting with the memory elements.

[0020]

Effects of the invention

As above, the present invention is provided with a video decoding means that decodes video signals from video bitstreams, an audio decoding means that decodes audio signals from audio bitstreams, a memory means that has storage capacity to temporarily hold a specified quantity of packets in the packet data streams and that is required for decoding by the video decoding means, and a memory control means that determines whether packet data strings that are input successively are video bitstreams or audio bitstreams in parallel with writing to the memory means, while repeatedly reading and distributing from the memory video bitstreams to the video decoding means and audio bitstreams to the audio decoding means according to the progress in decoding by each, and that uses the memory means to write the video signal decoded by the video decoding means, or to reference for the purpose of decoding or to read for the purpose of display output. In this way, the memory elements can be consolidated, the number of components can be reduced, and memory element storage capacity can simultaneously be effectively utilized. In addition, by consolidating the memory elements and managing in a unified way, the number of pins to connect with the memory elements can be reduced, and the three means—memory control means, video decoding means and audio decoding means—can be integrated on the same semiconductor chip.

Brief description of the figures

Figure 1 is a block diagram of a demodulator in a first application example of the present invention.

Figure 2 is a block diagram of a demodulator in a conventional example.

Explanation of symbols

10 Disc reading means
11 Memory control means
12 Memory means
13 Video decoding means

14 Audio decoding means

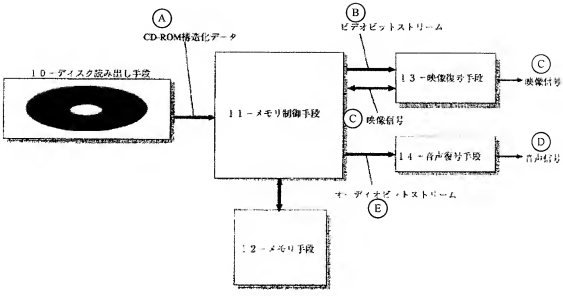


Figure 1

Key:
A CD-ROM structured data
B Video bitstream
C Video signal
D Audio signal
E Audio bitstream
10 Disc reading means
11 Memory control means
12 Memory means
13 Video decoding means
14 Audio decoding means

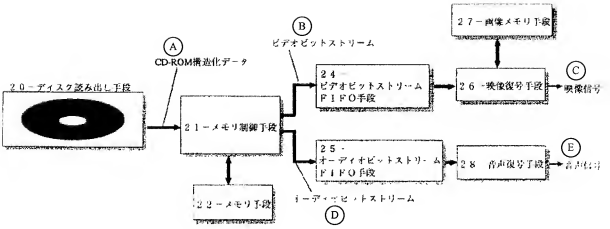


Figure 2

Key:

	A	CD-ROM structured data
	B	Video bitstream
	C	Video signal
	D	Audio bitstream
	E	Audio signal
	20	Disc reading means
	21	Memory control means
	22	Memory means
	24	Video bitstream FIFO means
	25	Audio bitstream FIFO means
	26	Video decoding means
	27	Picture memory means
	28	Audio decoding means

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